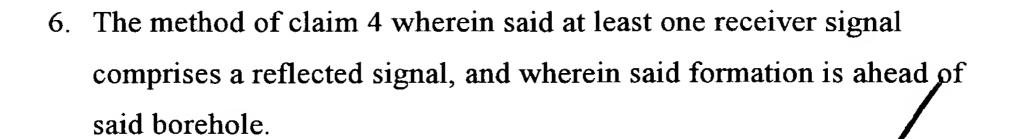
We Claim:

- 1. A method of using a bottom hole assembly deployed in a borehole to estimate a formation property comprising the steps of:
 - (a) generating a source signal from said bottom hole assembly;
 - (b) detecting at least one receiver signal using said bottom hole assembly;
 - (c) computing a frequency dependent characteristic of said at least one receiver signal; and
 - (d) using said frequency dependent characteristic to estimate said formation property.
- 2. The method of claim 2 wherein said tool is a bottom hole assembly of a drilling apparatus.
- 3. The method of claim 2 wherein said source signal is a noise spectrum generated by a drill bit of said drilling apparatus.
- 4. The method of claim 3 wherein said step of determining frequency dependence is carried out by cross-correlation analysis.
- 5. The method of claim 4 wherein said at least one receiver signal comprises a direct formation signal, and wherein said formation surrounds said borehole.

Sub

 $\mathbf{y}_{i} = \mathbf{t}^{i} = \mathbf{t}^{i}$



- 7. The method of claim 1 wherein said frequency dependent characteristic is amplitude attenuation.
- 8. The method of claim 7 wherein the formation property is pore pressure.
- 9. The method of claim 8 wherein said pore pressure is estimated from a frequency dependent attenuation relationship.
- 10. The method of claim 1 wherein said frequency dependent characteristic is wave propagation velocity.
- 11. The method of claim 10 wherein said formation property is pore pressure.
- 12. The method of claim 1 wherein said formation property is lithology.
- 13. The method of claim 1 wherein said formation property is fluid content.
- 14. The method of claim 1 wherein said formation property is rock strength.



The state of the s

1 1 2

- 15. The method of claim 1 wherein said tool is a bottom hole assembly of a measurement while well logging system.
 - 16. The method of claim 1 wherein said source signal is generated by an active source located on said bottom hole assembly.
 - 17. The method of claim 16 wherein said step of determining frequency dependence is carried out by a frequency component analysis.
 - 18. The method of claim 1, wherein said at least one receiver signal comprises a direct borehole signal.
 - 19. The method of claim 18 wherein said formation property is permeability.
 - 20. A method of continuously estimating the pore pressures of formations ahead of a bottom hole assembly, comprising the steps of
 - a) generating a source signal from said bottom hole assembly;
 - b) detecting at least one receiver signal using said bottom hole assembly;
 - c) using said source signal and said receiver signal to estimate a pore pressure of at least one said formation; and
 - d) repeating steps a), b), and c) as said bottom hole assembly moves sequentially downward through said formations.

====



- 21. A method of continuously monitoring the wellbore pressure safety margin corresponding to formations ahead of a bottom hole assembly, comprising the steps of
 - a) generating a source signal from said bottom hole assembly;
 - b) detecting at least one receiver signal using said bottom hole assembly;
 - c) using said source signal and said receiver signal to determine a pore pressure of said formation;
 - d) using said pore pressure to monitor said wellbore pressure safety margin; and
 - e) repeating steps a), b), c) and d) as said bottom hole assembly moves sequentially downward through said formations.
- 22. A method of continuously optimizing the weight of drilling mud used in a drilling operation, comprising the steps of
 - a) generating a source signal from a bottom hole assembly;
 - b) detecting at least one receiver signal using said bottom hole assembly;
 - a pore pressure of a formation ahead of said bottom hole assembly; and

d) using said pore pressure to specify a weight of said drilling mud which corresponds to a target wellbore pressure safety margin.